

WHAT IS CLAIMED IS:

1. A corneal surgery apparatus comprising:

an irradiation optical system for irradiating a laser beam onto a cornea of a patient's eye;

a moving unit which moves an irradiation position of the laser beam by the irradiation optical system relative to the patient's eye;

a characteristic point detection unit, having an image-pickup element for picking up an image of an anterior-segment of the patient's eye, which processes an image signal from the image-pickup element to detect a characteristic point in the anterior-segment image;

a storage unit which stores positional information on the characteristic point when the patient's eye is placed under a predetermined reference state;

a duction detection unit which detects a duction condition of the patient's eye based on positional information on the characteristic point when the patient's eye is placed under a surgery state and the stored positional information on the characteristic point; and

a movement control unit which controls the moving unit based on a detection result of the duction detection unit.

2. The corneal surgery apparatus according to claim 1, wherein the characteristic point is a plurality of marks previously provided to the patient's eye.

3. The corneal surgery apparatus according to claim 1, wherein the characteristic point is one selected from an iris pattern and a corneal limbus of the anterior-segment.

4. The corneal surgery apparatus according to claim 1, further comprising an alignment detection unit, having an image-pickup element for picking up an image of the anterior-segment, which processes an image signal from the image-pickup element to detect an alignment condition of the irradiation position with the patient's eye,

wherein the movement control unit controls the moving unit based on a detection result of the alignment detection unit and the detection result of the duction detection unit.

5. The corneal surgery apparatus according to claim 4, further comprising an irradiation control unit which controls laser irradiation based on whether at least one of the respective detection results of the alignment detection unit and the duction detection unit is in a predetermined allowable range.

6. The corneal surgery apparatus according to claim 1, further comprising:

a pupil position detection unit, having an image-pickup element for picking up an image of the anterior-segment, which processes an image signal from the image-pickup element to detect a pupil position of the patient's eye;

a storage unit which stores pupil position information when the patient's eye is placed under the predetermined reference state; and

a pupil deviation detection unit which detects a deviation condition of the pupil position based on pupil position information when the patient's eye is placed under the surgery state and the stored pupil position information,

wherein the movement control unit controls the moving unit based on a detection result of the pupil deviation detection unit and the detection result of the duction detection unit.

7. The corneal surgery apparatus according to claim 6, further comprising an irradiation control unit which controls laser irradiation based on whether at least one of the respective detection results of the pupil deviation detection unit and the duction detection unit is in a predetermined allowable range.

8. A corneal surgery apparatus comprising:

an irradiation optical system for irradiating a laser beam onto a cornea of a patient's eye;

a moving unit which moves an irradiation position of the laser beam by the irradiation optical system relative to the patient's eye;

an alignment detection unit which detects an alignment condition of the irradiation position with the patient's eye;

a duction detection unit which detects a duction condition of the patient's eye; and

a movement control unit which controls the moving unit based on a detection result of the alignment detection unit and a detection result of the duction detection unit.

9. The corneal surgery apparatus according to claim 8, further comprising an irradiation control unit which controls laser irradiation based on whether at least one of the respective detection results of the alignment detection unit and the duction detection unit is in a predetermined allowable range.

10. The corneal surgery apparatus according to claim 8, further comprising a pupil deviation detection unit which detects a deviation condition of a pupil position of the patient's eye,

wherein the movement control unit controls the moving unit based on the detection result of the alignment detection unit, the detection result of the duction detection unit and a detection result of the pupil deviation detection unit.

11. The corneal surgery apparatus according to claim 10, further comprising an irradiation control unit which controls laser irradiation based on whether at least one of the respective detection results of the alignment detection unit, the duction detection unit and the pupil deviation detection unit is in a predetermined allowable

range.

12. The corneal surgery apparatus according to claim 10, wherein

the alignment detection unit detects the alignment condition of the irradiation position with a pupil center position, and

the pupil deviation detection unit detects the deviation condition of the pupil center position due to a change in a pupil area.